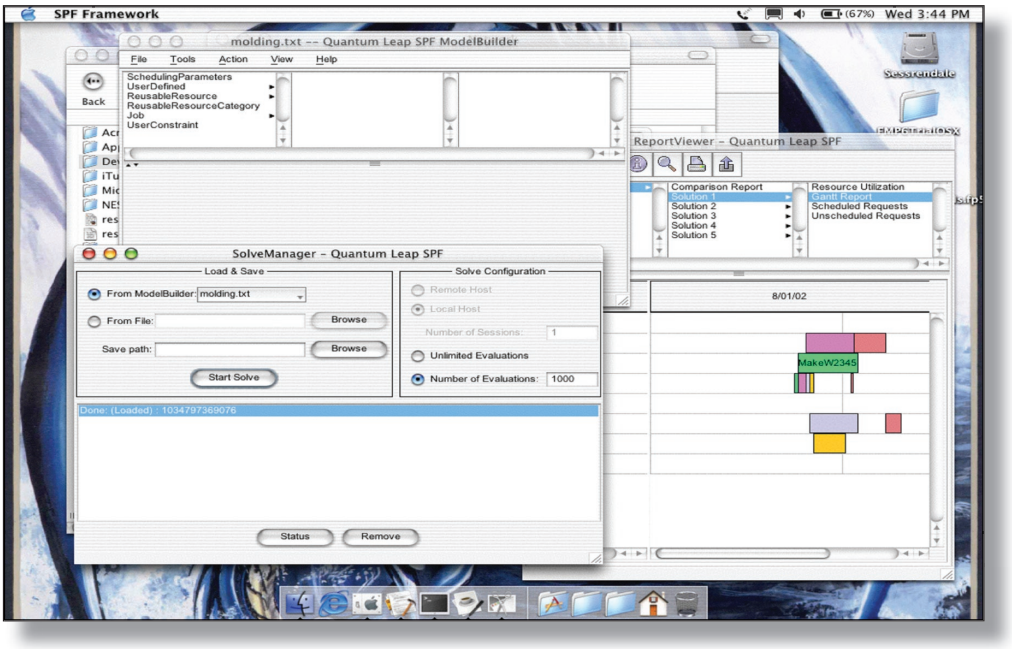
# Air Force Research Laboratory|AFRL

*Science and Technology for Tomorrow's Air and Space Force*

Air Force SBIR/STTR Celebrating 100 Years of Air & Space Innovation

## *Success Story*

# AFRL SMALL BUSINESS CONTRACTOR DEMONSTRATES AUTOMATED SOLUTION TO COMPLEX RESOURCE SCHEDULING CHALLENGES




The Space Vehicles Directorate tasked Quantum Leap Innovations (QLI) of Newark, Delaware, with developing an intelligent software scheduling solution capable of solving complex scheduling problems in almost any domain. As a demonstration of the software's power and flexibility, the company developed prototype scheduling solutions for the Air Force Satellite Control Network (AFSCN) and the Space Lift Range System (SLRS).

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## Accomplishment

The directorate awarded Phases I and II of Small Business Innovation Research (SBIR) grants to QLI to develop an artificial-intelligence-based software tool capable of rapidly creating solutions to complex resource scheduling problems. The Scheduling and Planning Framework (SPF) provides an interactive graphical environment that allows the modeler to specify scheduling problems using scheduling concepts like jobs, resources, requirements, constraints, and objectives.

QLI integrated their patented optimization engine, the Problem Solving Engine, with the SPF to solve the resulting model. By comparing the trade-offs associated with the top five schedules, the scheduler can select a schedule that meets his changing priorities and constraints.

For the AFSCN, SPF scheduled 80-90% of one day's ground antenna-to-satellite contact requests in less than 1 hour. SLRS schedules are particularly complex, but SPF scheduled 50-60% of the requested launch range assets in less than 10 minutes.

In recognition of QLI's work, the company received the Small Business Administration's Tibbetts Award. The Air Force gives this award annually to approximately 65 companies out of thousands of SBIR program participants.

## Background

The SLRS consists of ground-based surveillance, navigation, flight operations and analysis, communications, and weather assets located at Patrick Air Force Base (AFB), Florida and at Vandenberg AFB, California. This mission provides the Department of Defense (DoD), the National Aeronautics and Space Administration (NASA), and commercial customers with a highly reliable, integrated system to support spacecraft launch, ballistic missiles, and aeronautical testing. The launch range scheduler must correctly allocate support personnel, fuel and fire trucks, tracking antennae, transmit frequencies, and even volumes of air space.

The AFSCN is a worldwide network of remote tracking stations that offers real-time satellite tracking, command relay, and telemetry reception for DOD, NASA, and commercial customers. The schedulers at Schriever AFB, Colorado, must attempt to provide support for 450-500 ground antenna-to-satellite contacts per day.

Space Vehicles
Support to the Warfighter

## Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-VS-08)